2) $p(A \cap B) = p(A) \times p(B) \Leftrightarrow \frac{n}{2^n} = \left(1 - \frac{1}{2^{n-1}}\right) \times \frac{n+1}{2^n}$

$\Leftrightarrow n = n+1 - \frac{n+1}{2^{n-1}}$

$\Leftrightarrow \frac{n+1}{2^{n-1}} = 1$

$\Leftrightarrow \boxed{n+1 = 2^{n-1}}$

3) $\boxed{u_2} = 2 - (2+1) = \boxed{-1}$

$\boxed{u_3} = 2^2 - (3+1) = 4 - 4 = \boxed{0}$

$\boxed{u_4} = 2^3 - (4+1) = \boxed{3}$

4) $\forall n \geq 2$; $u_{n+1} - u_n = 2^n - (n+2) - 2^{n-1} + (n+1)$

$= 2^n - 2^{n-1} - 1$

$= 2^{n-1}(2-1) - 1$

$= 2^{n-1} - 1 > 0$ car $n \geq 2$

Donc (u_n) est strictement croissante.